



## CASE TEACHING NOTES for

# *Love Potion #10*

by

**Susan Holt**

Coordinating Mentor

New York State Biology Mentor Network

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## INTRODUCTION

Most non-majors in biology classes will not actually do scientific research outside of a classroom. They will, however, encounter many situations in which they need to consider whether evidence provides adequate support for scientific claims. This case was designed to encourage skepticism in evaluating an advertising claim that implies there is scientific evidence to support the claim. The advertisement for pheromones claims these products “get you more romantic attention.”

Even relatively unengaged students find this controversial topic an interesting way to discuss scientific methods. Instead of traditional lectures or readings on the “scientific method” and the process of science, small group and whole class discussions in this case are used to develop student skills in evaluating and testing a real-life, advertising claim.

I have used this case study in advanced, average, and below average high school (grades 9-12) biology classes. It could also be used in Advanced Placement Biology or introductory college biology classes. In my school, the case was used during the first few weeks of school because it served as an introduction to scientific thinking and sent a clear message that we expected students to link biology to the world around them. The science vocabulary in the case is intentionally kept to a minimum because we know that it will be formalized during lab and class activities later in the year.

The case could be used anytime during the school year. The most logical content connection would be during a unit on animal regulation or behavior, or as a review of the scientific process at the end of the year. If used later in the year, teachers should use more scientific vocabulary during class discussions. Consider using a handout with scientific vocabulary and definitions. Ask students to write an example based on the case study.

Using a topic involving sexuality requires an expectation that students will approach the topic with maturity. With many years of experience, I have developed low-key strategies for establishing and maintaining a mature classroom tone. Less experienced teachers should use this case only after they get to know their students and can control class discussions.

## Objectives

In completing this case study, students should:

- Understand that biological processes are thought to play a role in human behaviors.
- Apply skepticism in evaluating whether scientific evidence supports claims.
- Design an experiment to fairly test an advertising claim.

## CLASSROOM MANAGEMENT

Because this case study was also used as an introduction to case learning, small group and class discussion is organized around the answers to the study questions. This allows individual students to prepare for participation and assures that all students will have written information to share with their group or class. Most of the work is done during class, so that the instructor can provide support and assistance to students who have little experience in active learning. Done in the manner described below, this case should require a minimum of four periods (160 minutes) of class time. If used later in the year when students are familiar with case study learning, class time could be reduced.

Consider printing copies of the Internet advertisement at <http://www.Athena-inst.com> and having sample magazines with advertisements for Athena Pheromones for your students.

It is important to emphasize that the case questions have many possible answers. Encourage “science-phobic” students to participate by keeping criticism of student answers to a minimum at the beginning of the year. Student answers that appear trivial or incorrect can often be clarified by asking students “What does that mean?” or “Why do you think that?” Avoid teacher paraphrasing by encouraging students to summarize in their own words.

Students are asked to write their answers to each part of the case study on separate sheets of paper—not in the spaces on the handouts. This allows room for more elaborate answers and for future additions.

Using markers and large sheets of newsprint taped to the wall (or overhead transparencies) instead of writing directly on the blackboard allows you to save and post a record of the class discussion for future reference. You can substitute blackboard for newsprint if you do not want a record of the discussions.

### First Day - Complete Part I and Assign Part II

Try to find a copy of the song, “Love Potion Number 9.” Playing this at the beginning of the class starts the case with a humorous tone that “hooks” non-science types. This classic pop hit of Lieber and Stoller has several famous versions by such artists as The Clovers, The Ventures, and even Herb Alpert and the Tijuana Brass.

Ask students to begin by working individually for 5 minutes to answer the questions in Part I. This gives less confident students a chance to think before participating in a small group. Be sure to take time to explain that this is a “mature” topic and that you expect their conversations to be considerate, responsible, and mature. Expect some laughter and silliness at this point. Be prepared to correct a few students who will test your tolerance for inappropriate comments. Politely and positively remind them of the boundaries for “socially appropriate.”

Assign students to a small group of three to five students. Allow a few minutes for them to introduce themselves in their groups. Explain that they have 10 minutes to work with their group to share answers to the questions. Each person should use ideas from the group work to expand on their answers.

### Questions and Teaching Suggestions

1. Do you believe that the Athena pheromone really does what the ad claims?

*Informally survey the class. Put three categories on a newsprint sheet—”1. Works, Can’t Tell, Doesn’t Work.” Tally the number of students in each category. Save this for later reference.*

2. What information in the advertisement leads you to believe that the pheromone works?

*Make a heading on a newsprint sheet—"2. Support - Pheromone Works." Ask one member from each group to read one possible statement that answers the question. If time permits, call on volunteers to extend the list.*

3. What additional information would help to convince you that the pheromone does what is claimed?

*Make a heading on a newsprint sheet—"3. Additional Information Requested." Ask a different member from each group to read one possible statement that answers the question. If time permits, call on volunteers to extend the list.*

Assign completion of Part II for homework. Each student in a group gets the same questions but is provided with different references to read. The reference section at the end of the case teaching notes gives current URLs for possible articles. Try to match individual students with appropriately challenging reading—brief, general articles for below average students and long, detailed articles for advanced students. Most students have difficulty reading in a classroom setting. Completing Part II at home allows students to work at their own pace. *Do not ask students to find their own Internet sites for this case study! Using "human pheromones" for a keyword search will result in sites that are pornographic in content.*

## **Second Day - Discussion of Part II**

Students work to share their answers with their small groups for the first 20 minutes of class. For each question, all members of the group read their answer aloud. Other group members add more information to their answers as they listen. Encourage groups to make a list of questions they have about "Love Potion # 10."

Label three sheets of newsprint—"Know," "Supports," "Doubts." These are used to record the key ideas from class discussion.

### **Questions and Teaching Suggestions**

1. What is a pheromone? How do pheromones work? Do pheromones really affect human behavior?

*Call on one member of each group to help you make a list of what students know, or think they know, about pheromones on newsprint. Ask them to indicate whether they are sure (put an "S") or not sure (put a "?") about their statements.*

2. What information in the articles supports the advertising claim?

*Call on another member of each group to help you make a list of the information that supports the claim. Then ask for volunteers to challenge things that are on the list by explaining why they feel that information does not provide support. Put a "?" after statements that are challenged. What should begin to emerge is an understanding that there is weak support but little clear-cut evidence for the advertising claim.*

3. What information in the articles makes the advertising claim questionable?

*Call on one or two members of each group to help you make a list of the information that causes them to question/doubt the advertising claim. These are more difficult for students to consider. Allow more time for this discussion and try to make this list the same length as the previous one. Often the discussion here adds additional “?” marks to the previous column. It should become obvious that there is weak support but little clear-cut evidence for the advertising claim.*

4. Based on this information, do you believe that the Athena pheromone really does what the ad claims?

*Informally survey the class. Put three categories on a newsprint sheet—”1. Works, Can’t Tell, Doesn’t Work.” Tally the number of students in each category. Compare this with the similar sheet from Part 1. Ask students who changed their answer to explain why.*

Assign Part III questions 1 - 7 for homework. Warn students that they may find this type of reading difficult. Suggest they read each question and search for the answers in the reading. If they have trouble answering the question, they should at least quote one sentence from the reading that they think contains relevant information. This assignment encourages them to read carefully and do some pre-thinking about the elements of the experiment.

### **Day 3 - Complete and Discuss Part III**

[Please note: The data table and abstract have been modified to be more appropriate for high school students. Data on masturbation and statistical values were deleted.]

Allow 10 minutes for students to share and expand their answers to questions 1 - 8. Ask them to select one question they would like you to go over in class discussion. Just before the 10 minutes is up, visit each group to ask the number of the question that they found most difficult.

Write the problem question numbers on the board. Usually two or three questions are selected by many groups. Call for volunteers from other groups to explain their answers to these two or three questions.

Ask students to work in small groups to answer questions 9 and 10. Tell them they have 10 minutes to do this. Each group should make a large, two-column chart on newsprint for question 6—”Yes because” and “No because.”

### **Questions and Teaching Suggestions**

9. Do you think that Dr. Cutler’s research provides credible evidence that the pheromone Jean bought really does what the advertisement claims? Why might people answer “yes” to this question? Why might people answer “no” to this question?

*Introduce another technique for “class discussion.” After 10 minutes, suggest that each group send a “scout” (or two depending on group size) to visit other groups to get ideas for how to expand their answer to question 9. Allow 5 minutes for “scouting” and 5 minutes for the “scouts” to report back to their groups and add to the newsprint chart. Post these charts prominently. Ask students to look at the charts and identify the five most obvious reasons why Dr. Cutler’s research does not provide credible support for the advertising claim.*

10. Do you think you would get the same results if you replicated Dr. Cutler's research? Why or why not. Why has her experiment not been replicated by other researchers?

*Focus mainly on why people might not get the same results if they repeated Dr. Cutler's experiment. Call on each group to provide one reason their results might be different. List these reasons on newsprint. Call for volunteers to suggest how the experiment could have been changed to overcome these problems.*

#### **Day 4 - Complete and Discuss Part IV**

Set the stage by pointing out that Dr. Cutler's research was done using the male pheromone. It really doesn't address the question of whether the female pheromone that Jean bought really works. Point out that the questions break the task of designing an experiment into "baby steps." In the future, they will learn to design experiments without having "baby steps" provided. Have students work for 15 minutes in small groups to answer these questions.

During the remainder of class, call on one group to answer each question and explain why their answer is important in designing a fair test of the pheromone. Point out that explaining why will help them remember the important questions in experimental design.

#### **Closure**

Ask students to work individually for homework (or as a quiz/test) to prepare:

1. A list of 10 endings for the statement, "You should be skeptical if you notice an advertising claim that...."
2. A list of 10 endings for the statement, "When testing a product claim, a good experiment...."

Remind them that they can use their notes from the case study as a reference.

Take a few minutes at the beginning of the next class to ask each student to share one important thing from each of their lists. Record these on the blackboard.

#### **Part V - Enrichment**

I personally feel that it is important for students to understand that there are times when the methods of science collide with people's feelings, beliefs, or ethics. What seems to be the best course of action, from a scientific point of view, may not be the best course of action from a personal point of view. Understanding that scientists wrestle with what's "right" and "wrong" helps students to see scientists as real people.

Part V is optional but it has been an incredibly effective "hook" to catch the interest of many different kinds of students. The entire group of questions can be overwhelming for students. I typically assigned one or two due each Friday. I randomly select several students to read their answers aloud to the class and then ask if others would like to volunteer to read alternative points of view. I have been amazed at how much students looked forward to, and prepared for, these Friday sessions. Be careful to stay in the background of "their" discussion time.

Later in the year, students are asked to visit a health food store or the herbal medicine section in a grocery store/pharmacy. They select one product and do library and Internet research to determine if there is credible evidence that this product is safe and effective.

I have also had advanced students conduct and report on the pheromone experiments that they designed, but I had the approval of the building principal and the Board of Education before we did this. Be aware that many districts have policies restricting student surveys—particularly when they involve human sexuality.

## REFERENCES

Because Internet sources change frequently, I use <http://www.findarticles.com/> to locate science articles. This search engine has less “junk,” a printable version of all the articles, and gives a brief summary and article length in the initial listing. If you go to this site and type in “pheromones” for a search you will find many possible references.

### Articles for average students:

- The four articles from the links at Athena Institute Site at: <http://www.athenainstitute.com/discovery.html>
- The Smell of Sex at: <http://www.actuationinteractive.com/enter/play/smell/smell.html>
- Yes, Virginia, There Is a Pheromone at: <http://webmd.lycos.com/content/article/1728.56431>
- Pheromones, Brain Briefings at: <http://www.sfn.org/content/Publications/BrainBriefings/pheromones.html>

### Articles for advanced students:

- Pheromones: What’s In a Name? Elia Ben-Ari, *Bioscience*, July 1998.
- Pheromones in Humans: Myth or Reality? at: <http://www.cyborganic.com/people/dpwk/pher.html>
- The Sniff of Legend at:  
[http://cas.bellarmine.edu/tietjen/Human%20Nature%20S%201999/sniff\\_of\\_legend\\_by\\_karen\\_wright.htm](http://cas.bellarmine.edu/tietjen/Human%20Nature%20S%201999/sniff_of_legend_by_karen_wright.htm)

### For teacher reference:

The original journal article is not appropriate for use with high school students.

- Pheromonal Influences on Sociosexual Behavior in Men, Winnifred B. Cutler, Erika Friedmann, Norma McCoy, *Archives of Sexual Behavior*, Vol 27, No. 1, pp. 1-13, 1998.

Explore the Athena Institute Web Site at <http://www.athenainstitute.com/>.

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<http://www.metopera.org/history/week-961230.html>.

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